NETWORK HEALTH DIGEST

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MEDICAL MANAGEMENT OF TYPE 2 DIABETES

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The complexity of Type 2 Diabetes Mellitus (T2DM) is commonly misunderstood. This can lead to diagnosis denial and reluctance towards medical intervention. Diet and lifestyle changes can help to manage the condition; however, this might not be appropriate for all. This article will briefly outline T2DM risk factors, touch on physiology, and will discuss treatment options.

Diabetes is a common condition that is understood to affect 422 million people worldwide.[1] A new diagnosis of diabetes is given every two minutes.[2] Out of those diagnosed, around 90% are T2DM, 8% Type 1 (T1DM) and 2% rarer types.[3]

T1DM is an autoimmune condition that destroys the body's ability to produce insulin from the pancreas.[4] Differently, T2DM is characterised by insulin resistance (IR) and when this is combined with a reduced ability to produce insulin, it leads to failure to control blood glucose levels.[5]

RISK FACTORS FOR INSULIN RESISTANCE[6]

- Genetics – Parent or sibling with diabetes
- Ethnicity – African/Asian/Indian, Alaska Native, Hispanic/Latino, Native Hawaiian, or Pacific Islander American heritage
- Age – 45 years and older
- Metabolic syndrome; high blood pressure, abnormal cholesterol levels, increased waist circumference
- Gestational diabetes
- Previous heart disease or stroke
- Certain medicines, steroids, antipsychotics, HIV treatments
- Hormonal disorders; Cushing's syndrome, acromegaly, PCOS
- Sleep apnoea
- Low physical activity
- Overweight

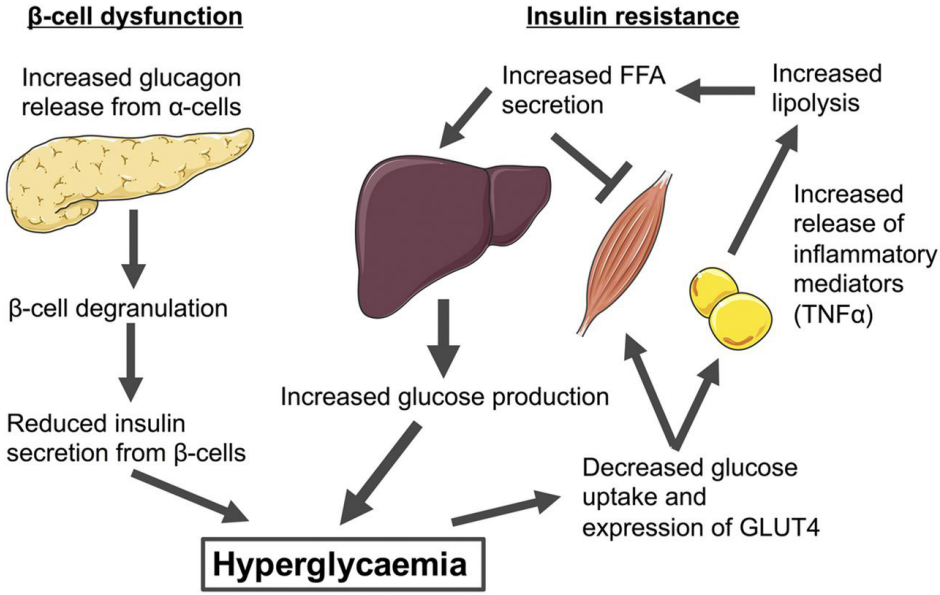
Lifestyle changes that support weight loss and increased activity are well known to be effective in preventing and managing T2DM.[7] However, the primary risk factors remind us that the media's caricature of someone with T2DM is overly simplistic and stigmatising.

It is understood that anyone with a BMI above 'healthy' (through fat rather than muscle) will have some degree of IR. Spread matters too, and risk is further increased if the fat is spread centrally rather than peripherally (apple versus pear shaped). Measuring waist circumference can be more helpful than BMI, and a high-risk reading is >35 inches for women or >40 inches for men.[8] Free fatty acids (FFAs), other hormones and proinflammatory substances are secreted and affect the metabolism. When combined with impaired pancreatic function, the result is reduced ability to control blood glucose levels, AKA T2DM.[9]

LIFESTYLE CHANGE AS TREATMENT

In our nurse- and dietitian-led education for people with newly

Figure 1: A pictorial description of IR contributing to the formation of T2DM[10]



diagnosed T2DM, the diabetes specialist nurses talk about 'lifestyle' as the first treatment, which is 'prescribed' to everyone in the first session. By this they mean increasing activity and eating within a balanced diet to support healthy weight.

It is important to realise that weight loss will not be appropriate for everyone (consider 80-year-old Betty whose BMI is only 23kg/m^2). For some people with T2DM, lifestyle changes can be enough to well manage the condition. But the condition is progressive (remembering that inevitable aging is a risk factor) and needing medication at a later date is almost guaranteed.

MEDICATIONS[12,13]

For T2DM, there is a plethora of medications, ranging from tablets to injections. As with many conditions, the treatment plan must be individualised to the personal circumstances. There is a range of options and there are side effects.

Understanding this, dietitians can help to guide the prescriber to choose medications that will effectively manage the diabetes, whilst also supporting their patients' lifestyles and behavioural change goals.

As already discussed, IR is the cornerstone of T2DM. There are tablets that work to reduce IR and improve insulin sensitivity, the two main being Metformin and Pioglitazone.

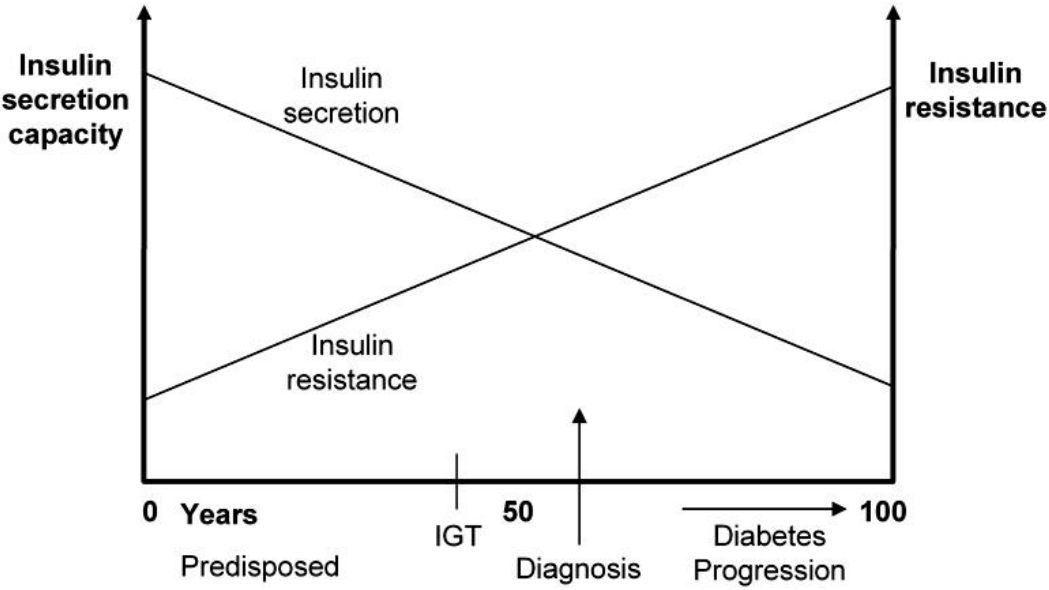
Metformin[14]

This is the most common medication and is usually the first choice. Metformin is usually started with one tablet per day, taken with food and titrated up to the maximum dose. Tablets can be crushed and added to food or prescribed in liquid form. It can be explained as the WD40 for the cells, making it easier for the insulin to enter.

Dietetic considerations:

- Weight neutral (new prescription is not indicated for people with a BMI <23kg/m2, but can be continued if weight loss has occurred once established).
- Taste changes (although, this is not something that I have come across).
- Reduced appetite.
- Not associated with hypoglycaemia.
- GI upset with diarrhoea, which is common and usually eases. If symptoms persist, the slow release version is usually found to be more tolerable. These cannot be crushed and added to food, but fewer tablets can reduce the burden of polypharmacy.

Figure 2: Diagram showing the progressive nature of Type 2 Diabetes[11]



Pioglitazone[15]

Pioglitazone has a protective factor for the cells in the pancreas, meaning that people with T2DM can continue to produce their own insulin for longer. I have not seen this medication prescribed, but colleagues tell me that it is an effective treatment, especially in cases where Metformin is not tolerated. It is less commonly prescribed, due to a known increased risk of bladder cancer. This risk has been reviewed by The European Medicines Agency who concluded that the increased risk of bladder cancer is outweighed by the known reduction in risk of stroke and heart attack. They suggest that Pioglitazone is still a valid treatment option, but should not be considered in those with active or past bladder cancer.

Dietetic considerations:

- 1-4kg weight gain in first six months (likely fluid retention).
- Not associated with hypoglycaemia.

Sulphonylureas[16] (Glibenclamide, Gliclazide, Glipizide, Glimepiride, Tolbutamide)

This group of tablets stimulate the cells in the pancreas to make more insulin. They also help insulin to work more effectively in the body. I once overheard these explained as working to 'spanc the panc', which helps me to remember!

Dietetic considerations:

- Associated with 1-4kg weight gain in first six months of therapy.
- Slow release version is available, but this can increase risk of weight gain.
- Risk for hypoglycaemia – patients must be issued with a glucometer and receive education on preventing and treating hypoglycaemia
- May be contraindicated for older adults who pose a particularly high risk of hypoglycaemia.[17]

Sodium glucose co-transporter-2 inhibitors (SGLT-2)[18] (Canagliflozin, Dapagliflozin, Empagliflozin)

This group of tablets act on the kidneys to reduce glucose reabsorption and promote urinary glucose excretion. SGLT-2 medications are not indicated with GFR <45.

Dietetic considerations:

- Weight loss.[19]
- Infections such as UTIs and thrush for women and men.
- Dehydration risk.
- Low risk of hypoglycaemia.

Dipeptidyl peptidase-4 inhibitors (DPP-4)[20] (Alogliptin, Linagliptin, Saxagliptin, Vidagliptin)

This group of tablets block the enzyme DPP-4, which protects the hormone incretin. Incretin acts as a switch to regulate insulin production and glucose levels in the blood.

Dietetic considerations:

- Weight neutral.
- Low hypoglycaemia risk.
- Slight increased risk of pancreatitis – symptoms may include upper abdomen pain, jaundice, weight loss, nausea, loss of appetite and fever. Contraindicated in people with previous pancreatitis.

Glucagon-like peptide-1 receptor antagonists (GLP-1), or incretin mimetics[21] (Dulaglutide, Exenatide BID/QW, Liraglutide, Lixisenatide)

These are injectable hormone treatments, given through a pen-like device. This treatment has three modes of action:

1 increased incretin hormones stimulate insulin secretion from the pancreas;
2 suppression of glucagon secretion;
3 reduced gastric emptying, supporting slower conversion of carbohydrates into glucose and reduce appetite.

Dietetic considerations:

- Weight loss – NICE guidance requires 3% weight loss over six months for drug continuation.[22]
- Likely GI disturbance, eases over time – patients often report that they have markedly reduced hunger and experience has shown me that patients who significantly reduce portion sizes when starting this medication are less likely to experience side effects. I haven't yet experienced whether patients regain appetite if the medication is discontinued.
- Low risk of hypoglycaemia.
- Risk of pancreatitis – symptoms as above.

Insulin

Insulin is another injectable treatment, given through a pen-like device. Pump devices are only available to those with T1DM.[23] Patients are often very concerned about starting insulin, and, unfortunately, this seems to stem from some professionals using the treatment as a threat. Often it seems that they are sent to the dietitian as a punishment and as a last resort before insulin is started. Sadly, this is very unhelpful.

For T2DM, there is a plethora of medications, ranging from tablets to injections. As with many conditions, the treatment plan must be individualised to the personal circumstances.

Insulin is most effective if IR medications are continued. Other medications may be continued or stopped with the addition of insulin, depending on the individual. The dietary implications will depend on the treatment regimen; however, education on preventing and treating hypoglycaemia as part of a healthy diet is essential.

REMISSION

Diabetes UK define remission as, 'blood sugars returning to healthy levels without the need for medication'. They suggest that your chance of remission is significantly increased if you can achieve 'around 15kg weight loss over three to five months'. This is based on the findings from the DiRECT trial. Although a hot topic, the term is not yet backed by conclusive guidelines, and Diabetes UK explain that they are still working with experts.[24]

CONCLUSION

Type 2 Diabetes is a complex condition based on multiple risk factors. Weight loss and increasing activity together can be a key management strategy to most with the condition. But disease progression is inevitable, and the formulation of an individualised treatment plan is vital.

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Questions relating to: *Medical management of type 2 diabetes* *Type your answers below, download and save or print for your records, or print and complete by hand.*	
Q.1	Describe the difference between T1DM and T2DM.
A	
Q.2	What are the main ways IR is measured and what influences these indicators?
A	
Q.3	Outline the way in which IR contributes to the formation of T2DM.
A	
Q.4	What is considered to be the first treatment for T2DM?
A	
Q.5	Outline the nature and dietetic considerations of the two main medications that are used to reduce IR and improve insulin sensitivity.
A	
Q.6	Briefly describe the progressive nature of insulin in the body and how it affects Type 2 Diabetes over time.
A	
Q.7	What consideration must be taken for patients who are prescribed insulin injections?
A	
Q.8	How is remission defined by Diabetes UK and what are the limitations of this definition?
A	
Please type additional notes here . . .	